



# Collins Class Full Cycle Docking Transition

## Positioning paper Version 4.0

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# Executive Summary

**The Federal Government has made significant and unprecedented commitments and investment in building a strong, sustainable and innovative Australian naval shipbuilding industry.**

Submarines are an essential part of Australia's naval capability. The Collins class submarine fleet will continue to serve Australia for many years, provided there is a strategic approach to a sustainment program that is efficient, effective and minimises risk. The sustainment program must continue to optimise the Collins class submarines' availability, reliability and capability.

To ensure that the Federal Government's long term, continuous shipbuilding plan is not jeopardised, this paper considers the benefits of relocating important sustainment activities, namely, the Full Cycle Docking (FCD) for Collins class submarines to the Henderson Maritime Precinct in Western Australia (Henderson).

Conducting FCDs for the Collins class submarines at Henderson has been a potential option for some time.<sup>1</sup> This relocation is important as it de-risks the delivery of the Collins class, Attack class and Hunter class programs of work.

The Henderson precinct has been successfully operating for more than ten years supporting sustainment and maintenance activities for the Collins class submarines. It has proven to be a mature and reliable partner to the Commonwealth<sup>2</sup> that has continued to enhance capability to contribute to the national effort on defence strategy and program delivery.

It is critical that the sustainment of the Collins class submarines is a prioritised and focused effort to ensure that the fleet remains regionally superior into the 2030s<sup>3</sup> and the transition into the Attack class submarines does not result in a capability gap. Any move of FCD cannot affect the operational needs of the Collins class submarines.

Western Australia is committed to being an enduring and integral part of Australia's maritime strategy and national security. It is home to Australia's largest naval base, HMAS Stirling, key Royal Australian Air Force and Australian Army bases, as well as strategic infrastructure which is important to Australia's national security.

The Western Australian Government is committed to investing a significant amount of resources,<sup>4</sup> with bipartisan support, to ensure it meets the needs of Defence. This will need to evolve and is a focus for Western Australia as it develops its future plan to cater for Defence. Western Australia has been a major contributor to the needs of the Australian Defence Force (ADF) and is well-placed strategically, politically and environmentally to enhance its contribution. It is prepared and ready for long-term commitment and success.

**This paper is focused on ensuring the ongoing capability of the Collins class submarines through mitigating the risks to the overall delivery of shipbuilding programs.**



**Relocating FCD to Western Australia is in the National Interest** – From a national interest perspective, relocating FCD to Western Australia is favourable. Moving FCD to Western Australia will co-locate sustainment work with operations - which is in line with international best practice.



**Western Australia is best placed to develop and retain the workforce required** – Western Australia has a highly skilled workforce including those already in Collins class sustainment. Moving FCD to Western Australia is in the national interest because it will reduce the workforce risk of trying to deliver the Attack class, Hunter class, and Collins class programs in one location.



**Significant infrastructure exists in Western Australia with advanced planning underway to enable enhanced defence industry capability** – The Australian Marine Complex is a world class centre of excellence for a number of industries that align with Defence. This already established infrastructure will be enhanced by the AMC Strategic Infrastructure and Land Use Plan to ensure Defence's needs are met.

This paper was prepared following consultation with experts and prominent individuals who have relevant experience and expertise in Defence and defence industry-related matters including current and former senior Defence personnel, government officials and representatives, and shipbuilding industry participants. Further, references have been made to the Western Australian Defence and Defence Industries Strategic Plan. This plan was developed to explicitly address the future needs of Defence and defence industries in Western Australia and provides a solid basis to understand Western Australia's current and future capacity.

# Background

**Submarines are an essential part of Australia’s naval capability and the Collins class submarine fleet will continue to serve Australia for many years provided there is a strategic approach to the sustainment program that is efficient, effective and minimises risk.**

This paper discusses the benefits of relocating Full Cycle Dockings (FCDs) from the Osborne North Shipyard in South Australia (Osborne) to then Henderson Maritime Precinct in Western Australia (Henderson).

Sustainment of the Collins class submarines is undertaken by ASC Pty Ltd.<sup>5</sup> After 10 years of service, a submarine undergoes a two-year FCD taking the submarine out of the water for an extensive maintenance and upgrade refit program. It includes corrective maintenance, refurbishment of statutory items, design change and capability enhancement and includes cutting the hull of the submarine to allow easier and more efficient access to the main motor and diesel engines before re-welding the hull.

FCDs involve complex activities requiring around 780,000 hours of work, and enables the submarine to serve for a further 10 years.<sup>6</sup> Osborne currently undertakes FCD for the Collins class submarines.

Mid Cycle Docking (MCD) takes place after five years of service and requires the submarine to be taken out of the water for one year for extensive maintenance. However, the maintenance is completed with the equipment in place and is less intrusive than a FCD. There is also intermediate docking which is typically a few months of preventative maintenance.<sup>7</sup>

Overall, there is considerable expertise and experience required to complete the maintenance and sustainment of the Collins class submarines. All maintenance and sustainment activities other than FCD are undertaken at Henderson.

MCD is conducted at Henderson which allows for an effective integration of the industry and Navy workforce with submariners able to participate alongside the other workers. This exchange of expertise facilitates the growth of the overall workforce for Navy and industry.

Further enhancements to the current Collins class submarine capability, as well as continuation of the sustainment effort, will continue into the late 2030s.

In addition to the FCD activity, the Collins class submarines will also commence the more complex Life of Type Extension (LOTE) work in 2026 with HMAS *Farncomb*.

While FCDs for the Collins class submarines currently take place at Osborne, the Government’s Naval Shipbuilding Plan anticipates possible changes by noting that ‘there will be further consideration about the appropriate long-term arrangements of Collins class and Attack class submarine sustainment activities.’<sup>8</sup>

Consideration of the long-term arrangements is timely.<sup>9</sup> The redevelopment of Osborne and the upgrades to the Henderson Precinct are underway. Decisions on the long-term arrangements of Collins class and Attack class submarine sustainment activities will enable the two locations to identify their short, medium and long-term capability and infrastructure requirements, and make prudent investment decisions to ensure Australia has a leading national naval shipbuilding and sustainment capability.<sup>10</sup>

In April 2016 the Federal Government announced Osborne is the build location for the Attack class submarine program, the largest Defence procurement in the nation’s history. By the mid 2020s submarines and frigates will be in full production at Osborne requiring 5,000 workers<sup>11</sup> which could significantly affect the workforce’s capacity to focus on FCDs, which requires more than 700 workers. It is imperative the delivery of all 3 programs of work is not put at risk.

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***The most critical consideration must be maximising the operating time of the Collins class submarines, and this can not be compromised...<sup>12</sup>***

# National Interest

**From a national interest perspective, relocating FCD to Western Australia is favourable. Locating all Collins class submarine sustainment activities alongside HMAS Stirling is consistent with Australia's geopolitical direction and also reflects broader international practice.**

The Federal Government announced in its 2016 Defence White Paper that the size of the submarine fleet would increase from 6 to 12, recognising that Australia will face a more challenging maritime environment in the decades to come.<sup>13</sup> It followed this with a clear and comprehensive commitment to investment in a sustainable, long-term naval shipbuilding and sustainment industry in its 'Naval Shipbuilding Plan 2017'. The Plan sets out the vision to deliver and sustain modern, capable naval vessels, on time and on budget, maximising Australian industry involvement and contributing to a secure and prosperous future for the nation.<sup>14</sup>

The Integrated Investment Program also prioritises investment in the existing Collins class fleet including, priority capability enhancements, obsolescence management and fleet sustainment, to ensure Australia's potent and agile submarine capability is maintained through the transition period to the introduction of the Attack class. A continual and relentless focus on ensuring we can achieve the highest levels of capability with the Collins fleet across this long period will be essential.<sup>15</sup>

The Government of Western Australia notes:

*'For a combination of reasons including geography, proximity to Fleet Base West infrastructure, possession of a highly skilled workforce and world class research and technology centres, Western Australia is the ideal location for maintenance and sustainment of our current and future Navy.'*<sup>16</sup>

## **Co-location is international best practice**

The separation of operations and maintenance in Australia is inconsistent with how this is done in other countries such as the United States, China and France.

Australia has an opportunity to align with international maintenance practices by conducting FCDs at Henderson.<sup>17</sup>

Completing the entire Collins class maintenance and sustainment in one location will also provide an opportunity for Australia's alliance partners with a highly capable support location for their operations in the region, as infrastructure enhancements will be required at Henderson to cater for FCD.

There are significant benefits associated with this such as stability of the workforce in changeovers and reducing the submarines' total time out of the water. In addition, there is the increased capacity to have submariners participating in sustainment work alongside industry partners. These advantages were cited in the 'Ship Zero' strategy which was developed and is equally applicable to submarines.

# National Interest Continued

## Geopolitical considerations

Australia's regional strategic environment has become more complex, and will continue to change throughout the 21st century. As a result, Western Australia's strategic location on the Indian Ocean, as part of this dynamic region, continues to have national and international implications.

A former Chief of Navy has spoken about Australia's 'Security Vision for the Indian Ocean', stating that the power balances have shifted to the Indo-Pacific and that the Indian Ocean is now centre-stage of global geopolitics.<sup>18</sup>

It is noted that by 2035, around half of the world's submarines will be operating in the Indo-Pacific region.<sup>19</sup>

Western Australia is of vital strategic importance and the presence of the Royal Australian Navy, and particularly its submarines, is critical in safeguarding and projecting Australia's presence across the Indo-Pacific region.

Australia is giving the Indian Ocean greater prominence because of the primary importance of the Indo-Pacific region as highlighted in the 2017 Foreign Policy White Paper. The Federal Government notes that its Indo-Pacific agenda is of fundamental importance to Australia's security and prosperity.<sup>20</sup>

Australia must recognize its evolving relationship with the Indo-Pacific region, and the role it may play in the coming decades.

'In the long-term, the Indian Ocean is going to be massively more significant in global politics than it has ever been before and that is the function largely of the fact that the Asia-Pacific region is massively more significant.'<sup>21</sup>

## Delivers on government policy

It is in the national interest to ensure the operational capability of the Collins class is not jeopardised. Relocating FCD of the Collins class submarines to Henderson will address potential risks to the operational capability, when you consider the pressure caused by the ramp up of the Attack class and Hunter class programs on the workforce.

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**Participating in the national endeavour to deliver a naval shipbuilding enterprise is far more than a business opportunity – it is an undertaking in the national interest, and one that Western Australia is determined to approach seriously.<sup>22</sup>**

The Government has made a significant commitment and investment in continuous naval shipbuilding, maintenance and sustainment in Australia.

Relocation of FCD to Henderson will contribute to the Federal Government's commitment to a safe and secure Australia while growing and enhancing the capability in Western Australia. The sustainment of the Collins class submarines will remain within sovereign Australian control, as will the infrastructure required for that sustainment.

Relocating FCD of Collins class submarines to Henderson aligns with the Federal Government's approach to give greater prominence towards the Indian Ocean given the importance of the Indo-Pacific region.

Existing Government policy, both at the Commonwealth and Western Australian State level is designed to provide long-term naval capability in Australia.

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**The ability to defend Australia's approaches depends on your deployment of naval units in areas of importance to us. This must include the Indian Ocean...<sup>23</sup>**

**'Perth's position as Australia's Indian Ocean capital places it at the fulcrum of the Indo-Pacific as a significant and increasingly important geo-political region.'<sup>24</sup>**

# Workforce

**Western Australia already has a highly skilled marine workforce including those already in Collins class sustainment. Further, there is significant synergies between other core Western Australian industries such as mining and subsea oil and gas producing longer term workforce resilience and reliability. This is also underpinned by substantial investment in education facilities and curriculum to grow the capability needed for the future.**

Australia is going to substantially increase the size of its submarine fleet with the new Attack class fleet double the size of the current Collins class fleet. The new submarines will be built domestically. This means the size of the submarine workforce in Australia (uniform and non-uniform) will need to increase dramatically.<sup>25</sup> Western Australia is well-placed to provide the capacity and capability required by building on the existing foundation of a stable and skilled workforce to match the industry's growing needs.

The 'Future Submarine Industry Skills Plan 2013' notes when the construction of the Attack class submarines start, Defence and the various companies contracted will have to manage workforce demand to ensure other activities are not impacted. The suggestion to solve this issue was to migrate FCDs of Collins class to Henderson to ensure that the future of all activities at Osborne are not compromised.<sup>26</sup>

## Current workforce capability

Western Australia already has a skilled workforce at Henderson who are committed to safety, quality and innovation in pursuit of excellent operational performance. The proximity to HMAS Stirling and SUBFOR HQ provides ready access to skills, expertise and collaboration. Building on this strong foundation is a prudent way forward.

Henderson provides a natural focus with increased synergies between not only Collins class maintenance, but also between Defence and civil maritime sustainment.

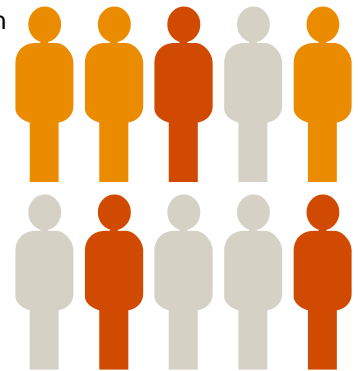
Drawing on the expertise from the subsea oil and gas, mining and other industry sectors provides a distinct opportunity to increase productivity and draw upon international best practice for the Australian naval shipbuilding industry.

It presents a significant opportunity to optimise the workforce, and leverage commercial capabilities for the benefit of Australia's national security.

The Federal Government noted in the Naval Shipbuilding Plan that 'Major shipbuilders in Western Australia are strongly engaged in ship sustainment (maintenance and repair) which draws on many of the same skilled trades, [across the oil and gas industry] and they have a significant export program and multiple lines of business beyond naval shipbuilding. These factors mean they have been less effected by cyclical demand from previous government contracts and have been able to better maintain skilled workforces.'<sup>27</sup>

In addition, the Western Australian Government is currently considering how investment in research and capability development within the LNG sector can be leveraged by Defence.

Defence industry would be in a position to capitalise on LNG investments in the development of training facilities and packages to upskill workforces. For example, the investment in the Australian Centre for Energy Process Training (ACEPT) facility at Munster has been leveraged to enable the Naval Base Shipbuilding Campus to be established.



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***Movement of FCDs to Henderson would enable the submarine aligned workforce to solely focus on one strategic aim – sustainment of the Collins class.<sup>28</sup>***

***It was also noted by the Coles Review that to avoid resource demand conflicts in South Australia, commencement of the Attack class submarine assembly will trigger the relocation of FCD to Western Australia.<sup>29</sup>***

# Workforce continued

## Education building capabilities

The South Metropolitan TAFE (SMT) is an integral member of the National Shipbuilding College. The Western Australian Government has recently invested \$2.4 million in the SMT Naval Base Campus, to plan for the future of Western Australia's growing defence industry. This builds on the previous investment in the Australian Centre for Energy and Process Training.

The new campus will deliver a multi-skilled workforce to meet the naval shipbuilding industry's requirements.<sup>30</sup>

Rio Tinto has also funded \$2m to South Metro TAFE to identify the workforce and skills requirements to support autonomous systems, including maintenance and sustainment in remote areas. This work is intended to upskill workers within Rio Tinto but will also benefit defence industry by being able to draw on the training packages developed.

In 2016 – 2017, Western Australia had more completions for naval shipbuilding related qualifications than any other state or territory in Australia<sup>31</sup> indicating the growing strength of the workforce for this industry.

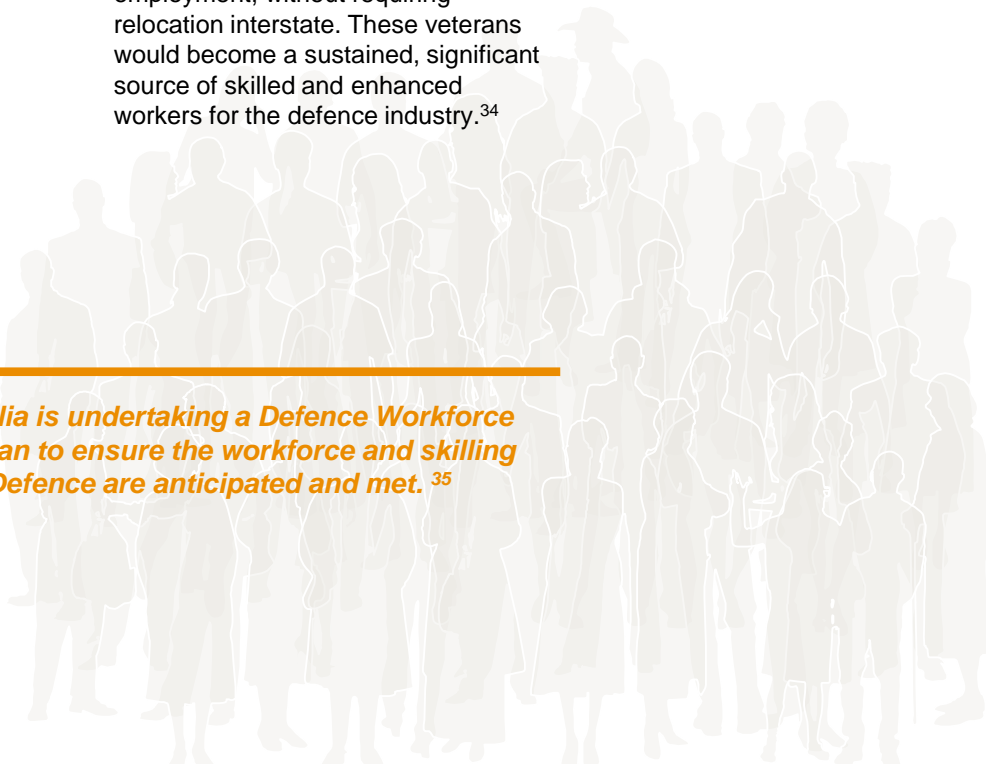
The Naval Shipbuilding College will be supporting education and training institutions to develop new courses. Bridging courses to train workers from adjacent industries (mining/oil and gas/construction) will support a rapid transition and fill the gaps seamlessly if FCD moves to Western Australia.<sup>32</sup>

## Resilience and stability of broader workforce

A critical advantage of Western Australia is the skill sharing and knowledge transfer across industries such as oil and gas and mining.

The Western Australian workforce has a high concentration of these skills and capabilities which will help de-risk future workforce requirements.

Shipbuilders often hire former Navy personnel given their knowledge of Defence and Defence processes.<sup>33</sup> Given the high population of serving and ex-service men and women in Western Australia, there is a clear opportunity to provide a pathway for veterans to transition into civilian employment, without requiring relocation interstate. These veterans would become a sustained, significant source of skilled and enhanced workers for the defence industry.<sup>34</sup>



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***Western Australia is undertaking a Defence Workforce Development Plan to ensure the workforce and skilling needs for Defence are anticipated and met. <sup>35</sup>***



# Workforce continued

Western Australia can maintain a skilled workforce during periods of increased activity in the resources sector:

- There is no indication that the level of activity and workforce demand seen during the resources boom will be seen in the coming decades.
- Western Australia learnt from the demands of the resources boom and put in place effective workforce planning and skills development packages, which enabled state, and national, economic prosperity to grow. The State Government is applying those lessons learnt to delivering the needs of the defence industry.
- Prices, particularly labour costs, in Western Australia have stabilised and settled in accordance with demand.

In fact there is more likely to be upward wage pressure in South Australia if FCD is not relocated and the smaller resource pool is forced to supply the workforce for Collins class, Attack class and Hunter class programs.

As part of any well planned move, consideration should be given to which elements of the current FCD workforce would need to transition and the appropriate timing for this. To de-risk any threat to the Collins class, Attack class and Hunter class programs of work, a phased approach will need to consider in detail which workforce segments are more mobile versus those which require a phased transition – for example core engineering and specialist skills.

All plans about transition will need to be pragmatic and designed around ensuring the lowest risk to delivery of all programs.

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***‘Western Australia’s local ship building and repair capacity is a strategic asset for Defence, due to the industry’s experience, expertise, flexibility and proven resilience. The State also has emerging defence industry capabilities including cyber security, space, aircraft maintenance and ICT support for Defence programs.’<sup>36</sup>***

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***With construction of 12 submarines to begin in Osborne in 2022-23, concurrently with surface ship construction,<sup>37</sup> relocating FCD to Henderson will mitigate the risk of a delay in any or all of the shipbuilding and sustainment programs because of workforce pressures.***

# Infrastructure

**The Australian Marine Complex is a world class centre of excellence for a number of industries which align with Defence. This already established infrastructure will be enhanced by the AMC Strategic Infrastructure Land Use Plan that is being developed in consultation with Defence to ensure long term capacity and accommodation of Defence requirements.**

Western Australia will remain a global leader in the export of commodities such as liquefied natural gas, iron ore, and lithium.<sup>38</sup> These industries and their associated infrastructure are of strategic interest to the nation and our allies.

Defence has an opportunity to leverage the competitiveness and commercial practices honed by Western Australian businesses which have needed to employ innovative and cost conscious practices to serve the resources industry. This includes access to intellectual property, equipment and supply chains for optimal output.<sup>39</sup>

## **Leveraging current infrastructure**

Further, any future investment in infrastructure in Western Australia will have multiple potential uses due to the already established adjacent industries. These industries such as subsea oil and gas, mining, engineering and fabrication have substantial synergies with Defence in terms of infrastructure and the skills needed. The introduction of FCD will drive further economic development opportunities and efficiencies applicable to the resources sector, including developing increased capacity which will assist in sustaining the sovereign defence capability requirements. These synergies with adjacent industries is unique to Western Australia.

The Australian Marine Complex (AMC) at Henderson was developed to be a world class centre of excellence for manufacturing, fabrication assembly and maintenance and technology activities to service the defence, marine and resource industries.<sup>40</sup> Henderson has been designed and constructed to increase the efficiency of maintenance activities through improved access to the submarines in the maintenance hall and on the hardstand.<sup>41</sup>

The Henderson facility is pivotal for streamlined maintenance and sustainment activities to support the Collins class fleet. The Western Australian Government has stated that current work at the facility ensures state-of-the-art submarine support and repair capabilities.<sup>42</sup>

Various build and sustainment programs and infrastructure development activities happening in Henderson will require careful coordination and planning between stakeholders from both government and industry.

## **Planning for the future**

The Western Australian Government has recently announced that the Henderson precinct master planning is underway with the development of the AMC Strategic Infrastructure and Land Use Plan. This will enable the future development of the AMC and Henderson precinct to continue to be a leading national naval ship building and sustainment precinct.

The plan will provide a comprehensive land and infrastructure response to the short, medium and long term requirements of Defence, and coordinate and optimise the land and infrastructure response to meet the needs of other key industry sectors including mining, oil and gas, marine and manufacturing.

The project team, including Defence West, and the designated representative on shipbuilding infrastructure for Defence, are defining the requirements to develop the plan.

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***HMAS Stirling in Western Australia is home to the six Collins class submarines.<sup>43</sup> .... the arrangements for sustainability must have regard to operational needs.***

# Infrastructure Continued

The Department of Defence has established the Henderson Precinct Security Working Group (PrSWG), which includes representatives from the Commonwealth, State Government (including Defence West), and key industry stakeholders located within the Henderson precinct.

The establishment of the PrSWG is a recent initiative by Defence, however the outcomes from the Working Group will feed into the Strategic Infrastructure and Land Use Plan, as well as being considered in the development of the service delivery model for the management of the Australian Marine Complex – Common User Facility (AMC-CUF).

Significant issues, as determined by the PrSWG, may be raised to the attention of the Government of Western Australia Security and Emergency Committee of Cabinet, of which the Minister for Defence Issues is a member, for further action.

A Government led taskforce has been established to oversee the preparation of the Plan, acknowledging there are multiple infrastructure and land use considerations at play to achieve the State’s vision for the AMC.

The Plan will ensure the successful integration of the future development of the AMC, focusing on creating a safe and efficient transport network, suitable utility and service connections and the provision of complementary services including future wharfing requirements. Improvements to the road and pedestrian network, high wide load corridors, opportunities for centralised parking and better public transport are factors being addressed through a dedicated transport study. Further land use considerations such as vessel transfer corridors, security buffers and the opportunity for precinct planning within the Common User Facility are being tested in collaboration with Defence as part of the options development and analysis phase of the project.

A strategic approach to infrastructure development at the AMC will ensure Henderson is best placed to support naval capability into the future. This long term focus requires significant investment from the State Government.

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***‘Somewhere around the 2032 to 2034 timeframe, perhaps sooner, we’ll run out of room to do everything in South Australia’.***<sup>44</sup>

**- Former Deputy Secretary of National Naval Shipbuilding and General Manager of Submarines, Mr Stephen Johnson**

Western Australia has a substantial advantage in terms of access to land and the ability to optimise that land use in comparison to South Australia where there are significant land constraints. In regards to the Osborne Naval Shipyard, South Australia is limited in its yard and yard design.

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**The Western Australian Defence and Defence Industries Strategic Plan notes a vision that by 2030:**

***Western Australia will remain the primary location for all Western Australia-based Surface Fleet Unit and Collins class submarine maintenance, sustainment, upgrades and decommissioning. This will include submarine Full Cycle Docking. It will remain Australia’s hub for all minor naval vessel shipbuilding and will continue to be a global export leader in minor naval vessel design, construction, and sustainment.***<sup>45</sup>

# De-risking Australia's submarine capability



The Federal Government has made a significant **commitment** to naval capability and continuous ship building in Australia. This commitment cannot be jeopardised and all risks to capability must be mitigated.



The workforce and infrastructure in Australia will require significant **expansion** to deliver on the Federal Government's commitment to domestic naval shipbuilding, maintenance and sustainability.



Western Australia has the **capacity** to accommodate the infrastructure and workforce needs to support the growing demand.



Conducting FCDs at Henderson would assist in delivering the Federal and State Governments' strong commitment to both national security and economic **prosperity**.



Australia's approach towards the Indian Ocean has been given greater prominence by the growing importance of the **Indo-Pacific** region.<sup>46</sup>



Australia's **alliance** partners will have a highly capable support location for operations in the region.

# References

1. Mentioned as a possibility as early as 2011 - Department of Defence, Commander D.L.Stevens RANR, FSM Basing Study, 15 December 2011.
2. ASC Pty Ltd Annual Report 2017, page 5.
3. ASC Pty Ltd Statement of Corporate Intent 2017 - 2022, page 9.
4. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018.
5. ASC Pty Ltd is a proprietary limited company registered under the *Corporations Act 2001*. ASC is wholly-owned by the Commonwealth, represented by the Minister for Finance (Shareholder Minister).
6. Australian Strategic Policy Institute, Thinking Through Submarine Transition, October 2018, page 10.
7. ASC, FCD Transition Study – First Draft Hypothesis Methodology, 30 April 2018 (redacted version released under FOI Act).
8. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017, paragraph 2.19.
9. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017.
10. Australian Strategic Policy Institute, Thinking Through Submarine Transition, October 2018.
11. The Hon Christopher Pyne MP, former Minister for Defence Industry, 23 March 2018.
12. Stakeholder consultations, July-August 2019.
13. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017, paragraph 4.26.
14. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017, Foreword, page 4.
15. Commonwealth Department of Defence, 2016 Defence Integrated Investment Program, paragraph 4.17.
16. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 31.
17. Yulin-East and Qingdao in China, L'Île Longue Submarine Base in France, HM Naval Base Clyde in the United Kingdom, and Naval Submarine Base New London in the United States.
18. Chief of Navy Address at Indian Ocean Naval Symposium - April 2018.
19. 2016 Defence Integrated Investment Program, paragraph 4.12.
20. Foreign Policy White Paper 2017, page 3.
21. Sergei DeSilva-Ranasinghe, Strategic Analysis Paper: Kim Beazley on the Strategic Importance of the Indian Ocean to Australia - June 2010, page 5.
22. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 28.
23. Kim Beazley, 'The Politics of the Two-Ocean Navy', The Australian Naval Institute, 2016.
24. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 27.
25. ASC Annual report 2018, page 7.
26. Commonwealth Department of Defence, Future Submarine Industry Skills Plan, 2013.
27. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017 page 67.
28. Coles Beyond Benchmark Report 2016, page 85.
29. Coles Beyond Benchmark Report 2016, page 85.
30. Government of Western Australia, Media Statements, McGowan Government boosts defence and shipbuilding opportunities, 6 May 2019  
<https://www.mediastatements.wa.gov.au/Pages/McGowan/2019/05/McGowan-Government-boosts-defence-andshipbuilding-opportunities.aspx>
31. Naval Shipbuilding Strategic Workforce Discussion Paper 2019 pages 27 and 29.
32. Naval Shipbuilding Strategic Workforce Discussion Paper 2019 pages 19 and 20.
33. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017, paragraph 4.26.
34. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 23.
35. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 7.
36. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 30.
37. Commonwealth Department of Defence, Naval Shipbuilding Plan, 2017.
38. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 26.
39. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 27.
40. Australian Marine Complex,  
<https://www.australianmarinecomplex.com.au/>
41. ASC Pty Ltd Annual Report 2018, page 11.
42. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 31.
43. Second Line of Defense, The Role of the Submarine in the Australian Deterrent Strategy, 9 September 2018,  
<https://sldinfo.com/2018/09/the-role-of-the-submarine-in-the-australian-deterrent-strategy/>
44. Mr Stephen Johnson, Deputy Secretary, national Naval Shipbuilding, and General Manager, Submarines, Department of Defence, Senate Estimates, Foreign Affairs, Defence and Trade Legislation Committee, 20 February 2019, page 70; Australian Strategic Policy Institute, Submarine Transition Plan Takes Place, March 2019.
45. Government of Western Australia, Western Australian Defence and Defence Industries Strategic Plan, 2018, page 3.
46. Foreign Policy White Paper 2017, page 3.